

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

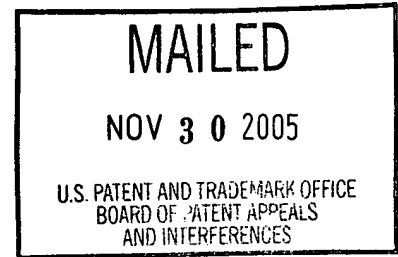
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte WEN-CHIH CHIOU and SYUN-MING JANG

Appeal No. 2005-1392
Application No. 09/761,486

ON BRIEF



Before GARRIS, KRATZ and PAWLIKOWSKI, Administrative Patent Judges.
KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1, 2, 5-7 and 9-17, which are all of the claims pending in this application.

BACKGROUND

Appellants' invention relates to a method of depositing an anti-reflective coating (ARC) layer on a semiconductor having a SiN_x or polysilicon surface layer, wherein the ARC layer includes dielectric material selected from silicon dioxide and SiONH. The deposited ARC layer is thereafter annealed at a temperature

greater than or equal to 400°C. Exemplary claim 1 is reproduced below.

1. A method for adjusting the optical properties of an anti-reflective coating (ARC) layer comprising the steps of:

providing a preprocessed semiconductor substrate having a SiN_x or a polysilicon layer on a top surface;

depositing a dielectric ARC layer on said SiN_x or said polysilicon layer wherein said dielectric ARC layer is deposited of a material selected from the group consisting of SiO₂ and SiONH; and

annealing said dielectric ARC layer deposited on said semiconductor substrate at a temperature of at least 400°C.

The prior art references¹ of record relied upon by the examiner in rejecting the appealed claims are:

Demirlioglu	6,063,704	May 16, 2000
Yao et al. (Yao)	6,258,734	Jul. 10, 2001
Plat et al. (Plat)	6,256,751	Jul. 24, 2001
Sandu et al. (Sandu)	6,268,282	Jul. 31, 2001
Holscher et al. (Holscher)	6,274,292	Aug. 14, 2001
Lee	6,300,672	Oct. 09, 2001

Claims 1, 2, 5, 9-11 and 13-17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Plat in view of Holscher. Claims 6 and 7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Plat in view of Holscher and Demirlioglu. Claims 1, 2, 6, 9-11 and 13-17 stand rejected under

¹ The last four listed references are available as prior art under § 102(e) based on their respective effective filing dates.

35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat. Claims 5, 7 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat and Sandhu. Claim 12 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat, and Le or Yao.

We refer to the brief and to the answer for a complete exposition of the opposing viewpoints expressed by appellants and the examiner concerning the issues before us on this appeal.

OPINION

Having carefully considered each of appellants' arguments set forth in the brief, appellants have not persuaded us of reversible error on the part of the examiner. Accordingly, we adopt the examiner's factual findings as our own and will affirm the examiner's rejections for substantially the reasons set forth by the examiner in the answer. Moreover, we substantially agree with the examiner's extensive remarks set forth in the answer in rebuttal of appellants' arguments as presented in the brief. We add the following primarily for emphasis.

Appellants present four groups of claims (each grouping corresponding with one of the examiner's first four stated separate rejections, as separately discussed below). Appellants state that "the claims stand or fall together within their

respective groups" (brief, page 6). The examiner's fifth stated rejection involves only one claim. Accordingly we select a representative claim for each of the four separate groups of claims on which we shall decide this appeal as to each of the examiner's separate obviousness rejections that relate thereto. We select claim 1 as the representative claim for the examiner's first and third stated rejections, claim 6 as the representative claim for the examiner's second stated rejection, claim 5 as the representative claim for the examiner's fourth stated rejection. Claim 12 is the sole claim at issue in the examiner's fifth stated rejection.

Rejection of claims 1, 2, 5, 9-11 and 13-17

In representative claim 1 the ARC layer that is deposited in the claimed method is formed from SiONH or silicon dioxide and the preamble of claim 1 indicates that an optical property adjustment of the ARC layer results from the recited method steps (deposit and annealing steps).

As determined by the examiner, Plat discloses that a typical ARC layer that is deposited on a polysilicon layer of a semiconductor substrate can be SiON. Plat teaches that a subsequent heat treatment of the ARC layer is performed at a temperature of between 800 and 900 °F (about 426 through 482 °C)

for about 5-30 minutes, preferably in the presence of oxygen. Plat teaches that the heat treatment condenses the ARC layer without adversely affecting the antireflective properties thereof.

The examiner also relies on Holscher. Holscher teaches that SiON and SiONH are alternative materials for use as an ARC layer for a semiconductor. The ARC layer is later subjected to an annealing (heat treatment) at temperatures greater than about 400 °C. That heating (annealing) alters the optical properties of the antireflective (ARC) layer according to Holscher (column 3, lines 38-60).

Based on functional equivalence and teachings of Holscher as to the alternative use of either SiONH or SiON as ARC layers coupled with the indication in Plat that SiON is a typical ARC layer material, the examiner has basically determined that one of ordinary skill in the art would have been led to the use of SiONH as taught by Holscher as a substitute for SiON in forming the Arc layer of Holscher with a reasonable expectation of success in so doing. We agree.

Moreover, given that representative claim 1 does not call for any particular amount of change in the antireflective properties of the ARC layer based on the claimed method steps and

that the heating step of Plat include temperature, time and environmental (oxygen atmosphere) conditions that correspond with appellants' disclosed and claimed annealing conditions, we agree with the examiner that one of ordinary skill in the art would have reasonably expected that at least some change in the antireflective properties of the ARC layer would result from the heat treatment step of Plat, especially when taken in combination with Holscher. See In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980); In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

Appellants argue that: (1) Plat is concerned with achieving a different result than appellants are concerned with; (2) that Plat is not concerned with a compatibility problem between the ARC layer and the substrate surface and a solution to that problem as is addressed by appellants' method; (3) that there is an inadequate factual basis for the examiner's rejection and (4) that there is a lack of motivation/suggestion for the examiner's proposed combination of references. We disagree for substantially the reasons set forth by the examiner under the subheading Issue 1 at pages 16 through 23 of the answer. In particular, we note that appellants have not offered any persuasive evidence that applicant discovered a problem with

compatibility between a substrate polysilicon or SiN_x layer that was previously unknown to the extent appellants may be arguing such is the case. Nor have appellants submitted a reply brief explaining why the examiner's rebuttal of appellants position is in error, particularly wherein the examiner maintains that Plat does not discuss such a compatibility problem because there is no such problem when employing SiON as the ARC.

Moreover, while appellants assert that Plat achieves a different result (condensation of the ARC layer) than appellants do, no evidence substantiating such a difference in result that is commensurate in scope with the claims has been furnished. In this regard, we note that claim 1 does not exclude the occurrence of condensation of the ARC and no particular degree of compatibility is claimed at or disclosed. Nor does representative claim 1 require any particular amount of optical property adjustment.²

Indeed, appellants' presentation at pages 8-11 of the brief appears to be misleading and disingenuous in suggesting that other than a SiON ARC material is necessary for compatibility

² Of course, as pointed out by the examiner in the answer, much of appellants' argument is misdirected at Platt, as if applied alone, rather than at the rejection made by the examiner, which is based on the combined teachings of Plat and Holscher.

purposes and that appellants' invention discloses the necessity of using either SiON or silicon dioxide as the ARC material (brief, page 8), especially when considered in conjunction with the quote from the specification reproduced at page 9 of the brief. That quote conspicuously leaves out the specification sentence that follows the last line that was reproduced in the brief. The following specification sentence reads "[t]he dielectric ARC, which is quite different than organic ARC such as organic dyes or inorganic ARC such as TiN or TiW, may be SiO, SiON or SiONH" (specification, page 3, lines 18-20). That specification sentence hardly suggests that other than the use of SiON is necessary for compatibility as implied in the arguments in the brief.³

As such, appellants' presentation is clearly unpersuasive, perhaps even unwarranted in an appeal brief submitted on this record.

It follows that we will affirm the examiner's first stated obviousness rejection for reasons set forth in the answer and above.

³ Also, see the paragraph bridging pages 6 and 7 of appellants' specification.

Rejection of claims 1, 2, 6, 9-11 and 13-16

Concerning the examiner's alternative rationale for combining the teachings of Holscher and Platt as set forth at pages 10-13 of the answer, appellants do not separately argue that separate obviousness position of the examiner. Rather, appellants refer to the arguments made against the examiner's other separately stated rejection over Platt in view of Holscher in arguing about an alleged compatibility problem not addressed by the references. As such, we shall also affirm the examiner's third stated obviousness rejection for the reasons stated by the examiner in the answer and above.

Rejection of claims 6 and 7

Concerning the examiner's separate 103(a) rejection of dependent claims 6 and 7 as being unpatentable over Platt in view of Holscher and Demirlioglu, we note that appellants make the same basic argument for the patentability of this grouping of claims (claim 6 selected as representative, as noted above) as for the patentability of independent claim 1 and does not otherwise disagree with the examiner's additional application of the teachings of Demirlioglu to the subject matter of representative claim 6. Consequently, we shall also affirm the examiner's obviousness rejection of claims 6 and 7.

Rejection of claims 5, 7 and 17

In a separate § 103(a) rejection, the examiner applies Sandhu in addition to Holscher and Plat in asserting the obviousness of claims 5, 7 and 17. Appellants do not separately address this rejection in the brief based on the subject matter of representative claim 5 but rather argue again on the basis of the features of independent claim 1 in addressing the examiner's rejection of these dependent claims. See page 14 of the brief. Consequently, we shall also sustain the examiner's § 103(a) rejection of claims 5, 7 and 17 on this record.

Rejection of claim 12

In the separate § 103(a) rejection of claim 12, the examiner applies Lee and Yao in addition to Plat and Holscher. Appellants do not separately address this rejection in the brief based on the subject matter of claim 12 but rather argue again on the basis of the features of independent claim 1 in addressing the examiner's rejection of this dependent claim. See page 15 of the brief. Consequently, we shall also sustain the examiner's § 103(a) rejection of claim 12 on this record.

CONCLUSION

The decision of the examiner to reject claims 1, 2, 5, 9-11 and 13-17 under 35 U.S.C. § 103(a) as being unpatentable over Plat in view of Holscher; to reject claims 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Plat in view of Holscher and Demirlioglu; to reject claims 1, 2, 6, 9-11 and 13-17 under 35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat; to reject claims 5, 7 and 17 under 35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat and Sandhu; and to reject claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Holscher in view of Plat, and Le or Yao is affirmed.

AFFIRMED

BOARD OF PATENT
APPEALS
AND
INTERFERENCES

Appeal No. 2005-1392
Application No. 09/761,486

Page 13

TUNG & ASSOCIATES
SUITE 120
838 W. LONG LAKE ROAD
BLOOMFIELD HILLS, MI 48302